Q-Winds OVW Retrievals in Extreme Wind Events

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This paper documents the results of a dissertation recently completed at the CFRSL to develop an improved ocean wind vector retrieval algorithm that uses both active and passive measurements from QuikSCAT. The QuikSCAT Radiometer (QRad) ocean brightness temperature is used to model the effective atmospheric transmission through rain, which is used to estimate the 'true" ocean surface sigma-0 from the measured backscatter at the top of the atmosphere. Next, MLE wind retrievals are performed using an "extreme-winds" geophysical model function (XW-GMF) tuned with hurricane surface wind measurements derived from NOAA hurricane hunter aircraft underflights. This algorithm results in significant improvements in wind vector measurements in hurricanes and other extreme wind events and better rain-flagging of severely rain contaminated areas than does NASA's standard wind vector product (L2B-12.5km).

The results from this algorithm, known as Q-Winds, are compared to an independent surface wind analysis derived from near-simultaneous NOAA aircraft flights through several hurricanes with 18 QuikSCAT satellite passes. Airborne sensors, that include the Stepped Frequency Microwave Radiometer, GPS dropwindsondes and flight-level inertial navigation winds, are used by the NOAA Hurricane Research Division's H*Wind Analysis System to derive a reliable surface wind field. Comparisons are presented for H*Wind, Q-Winds and the SeaWinds Project's L2B12.5 ocean vector winds products.